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(54) Title: POLYPEPTIDE-VACCINES FOR BROAD PROTECTION AGAINST HYPERVIRULENT MENINGOCOCCAL LINEAGES

(57) Abstract: A small number of defined antigens can provide broad protection against meningococcal infection, and the invention provides a composition which, after administration to a subject, is able to induce an antibody response in that subject, wherein the antibody response is bactericidal against two or three of hypervirulent lineages A4, ET 5 and lineage 3 of *N.meningitidis* serogroup B. Rather than consisting of a single antigen, the composition comprises a mixture of 10 or fewer purified antigens, and should not include complex or undefined mixtures of antigens such as outer membrane vesicles. Five protein antigens are used in particular: (1) a 'NadA' protein; (2) a '741' protein; (3) a '936' protein; (4) a '953' protein; and (5) a '287' protein.

WO 2004/032958 A1

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, BIOSIS, WPI Data, MEDLINE, PAJ, EMBASE

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	WO 01 64920 A (COMANDUCCI MAURIZIO ;PIZZA MARIAGRAZIA (IT); CHIRON SPA (IT); GALE) 7 September 2001 (2001-09-07) cited in the application page 24	1-3,16, 17,19-29
X	WO 01 64922 A (COMANDUCCI MAURIZIO ;PIZZA MARIAGRAZIA (IT); CHIRON SPA (IT); GALE) 7 September 2001 (2001-09-07) cited in the application page 37 page 54	1-3,16, 17,19-29
P,X	WO 03 020756 A (PIZZA MARIAGRAZIA ;CHIRON SPA (IT)) 13 March 2003 (2003-03-13) cited in the application page 8	1-3, 16-29

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☒ Further documents are listed in the continuation of box C.

Y Patent family members are listed in annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	WO 03 010194 A (COMANDUCCI MAURIZIO ;ARICO MARIA (IT); CHIRON SPA (IT)) 6 February 2003 (2003-02-06) cited in the application page 13, line 13	1, 3, 28, 29
X	COMANDUCCI MAURIZIO ET AL: "NadA, a novel vaccine candidate of Neisseria meningitidis" JOURNAL OF EXPERIMENTAL MEDICINE, vol. 195, no. 11, 3 June 2002 (2002-06-03), pages 1445-1454, XP002272871 ISSN: 0022-1007 cited in the application page 1446	30
A	GRIFANTINI RENATA ET AL: "Previously unrecognized vaccine candidates against group B meningococcus identified by DNA microarrays" NATURE BIOTECHNOLOGY, vol. 20, no. 9, September 2002 (2002-09), pages 914-921, XP002272872 ISSN: 1087-0156 the whole document	1-31

INTERNATIONAL SEARCH REPORT

Intern al application No.
PCT/IB 03/04848

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
Although claim 28 is to a method involving a surgical step to be carried out on the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0164920	A	07-09-2001	AU 3249200 A	17-11-2000
			AU 3947801 A	12-09-2001
			AU 3948801 A	12-09-2001
			BR 0010361 A	10-06-2003
			CA 2371032 A1	09-11-2000
			CA 2400562 A1	07-09-2001
			CA 2400570 A1	07-09-2001
			CN 1359426 T	17-07-2002
			CN 1426471 T	25-06-2003
			CN 1426473 T	25-06-2003
			EP 1185691 A1	13-03-2002
			EP 1261723 A2	04-12-2002
			EP 1259627 A2	27-11-2002
			WO 0164920 A2	07-09-2001
			WO 0164922 A2	07-09-2001
			JP 2003527079 T	16-09-2003
			JP 2003525049 T	26-08-2003
			JP 2003525050 T	26-08-2003
			WO 0066791 A1	09-11-2000
WO 0164922	A	07-09-2001	AU 3249200 A	17-11-2000
			AU 3947801 A	12-09-2001
			AU 3948801 A	12-09-2001
			BR 0010361 A	10-06-2003
			CA 2371032 A1	09-11-2000
			CA 2400562 A1	07-09-2001
			CA 2400570 A1	07-09-2001
			CN 1359426 T	17-07-2002
			CN 1426471 T	25-06-2003
			CN 1426473 T	25-06-2003
			EP 1185691 A1	13-03-2002
			EP 1261723 A2	04-12-2002
			EP 1259627 A2	27-11-2002
			WO 0164920 A2	07-09-2001
			WO 0164922 A2	07-09-2001
			JP 2003527079 T	16-09-2003
			JP 2003525049 T	26-08-2003
			JP 2003525050 T	26-08-2003
			WO 0066791 A1	09-11-2000
WO 03020756	A	13-03-2003	WO 03010194 A2	06-02-2003
			WO 03020756 A2	13-03-2003
WO 03010194	A	06-02-2003	WO 03010194 A2	06-02-2003
			WO 03020756 A2	13-03-2003